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(54) Abstract Title

**Coin store and dispenser arrangement**

(57) A "last in-first out" coin store receives coins which are stored in a stack, and moves the stack upwardly so that the uppermost coin is brought to a dispensing location at which it is pushed off the stack by a slide 140. The slide 140 is caused to move upwardly with the stack so that it bears a predetermined relationship, during dispensing, with the uppermost coin. The top of the stack is normally positioned at a predetermined distance below the dispensing location so that incoming coins tend to fall and then lie flat on the top of the stack. If however, a new coin is dropped on the stack and does not lie flat 160, this is detected and the stack is reciprocated upwardly and downwardly in order to make the coin lie flat.

The coin store may be provided with a device to calculate the number of coins in the stack. The calculation is made by moving the stack between a first position in which an endmost coin is at a predetermined location and a second position in which the other end of the stack is at a predetermined location, and calculating the number of coins in the stack on the basis of the amount of movement.

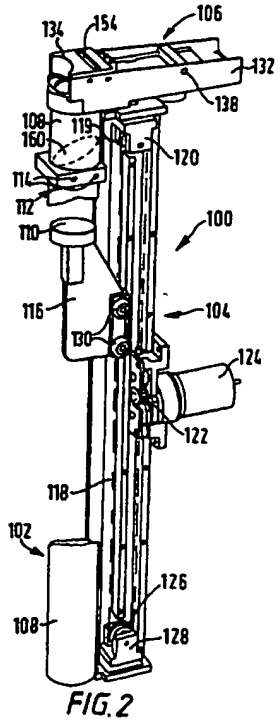
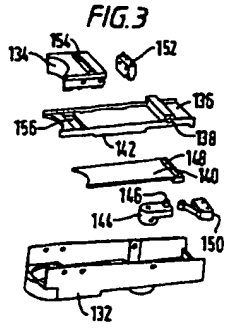



FIG.2

FIG.3

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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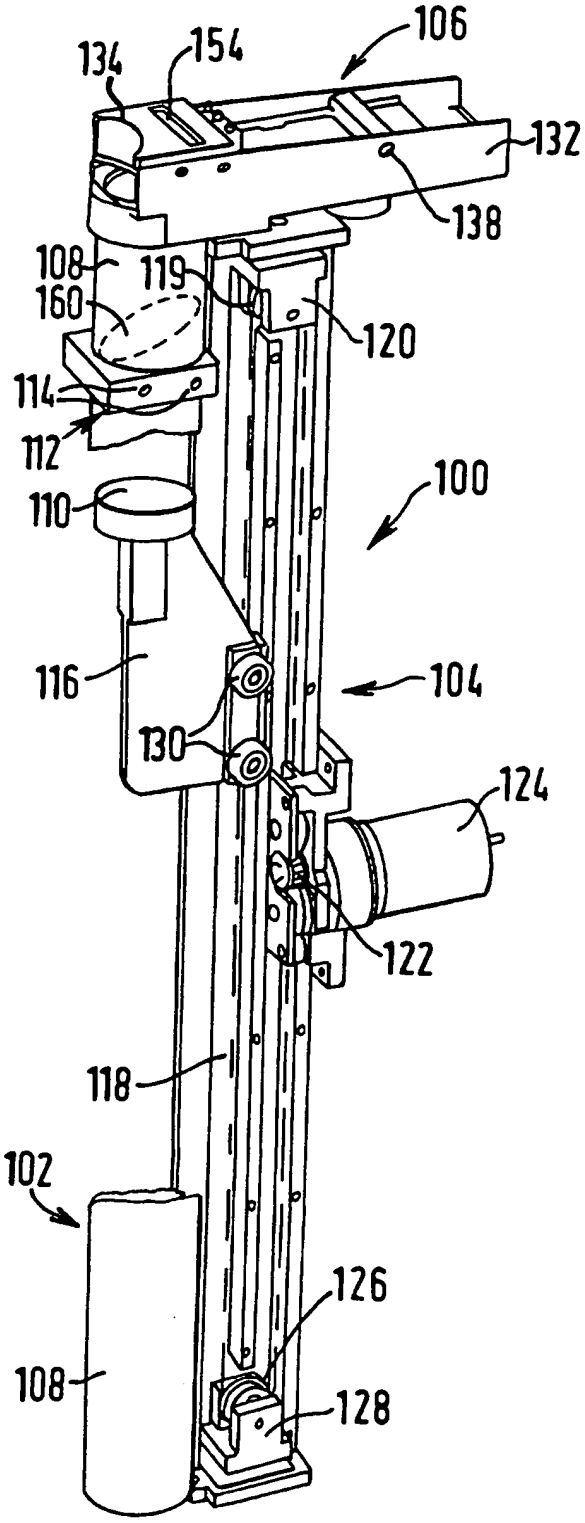


FIG.2

FIG.1

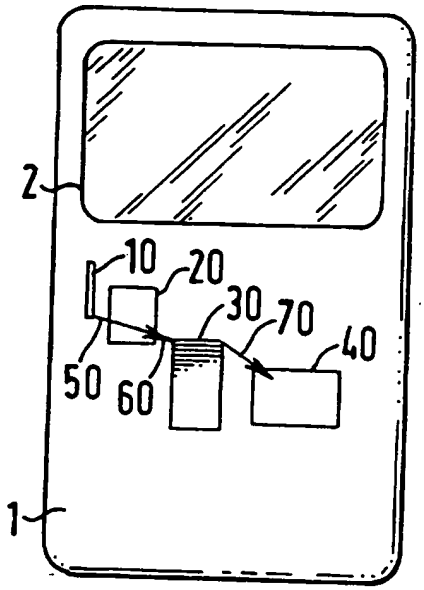


FIG.3

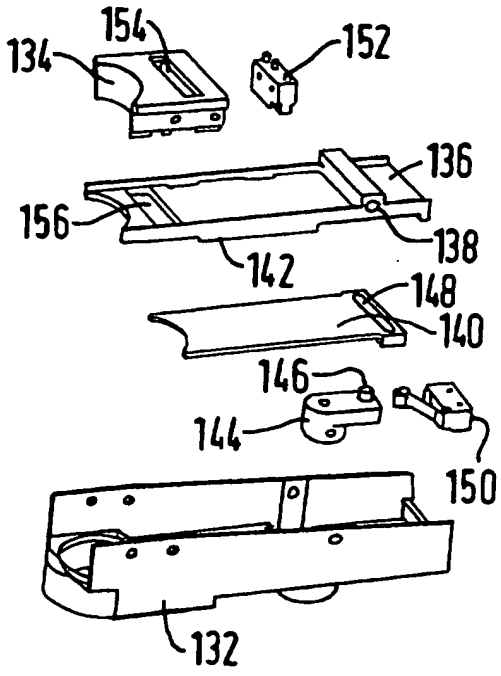

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Fig. 4

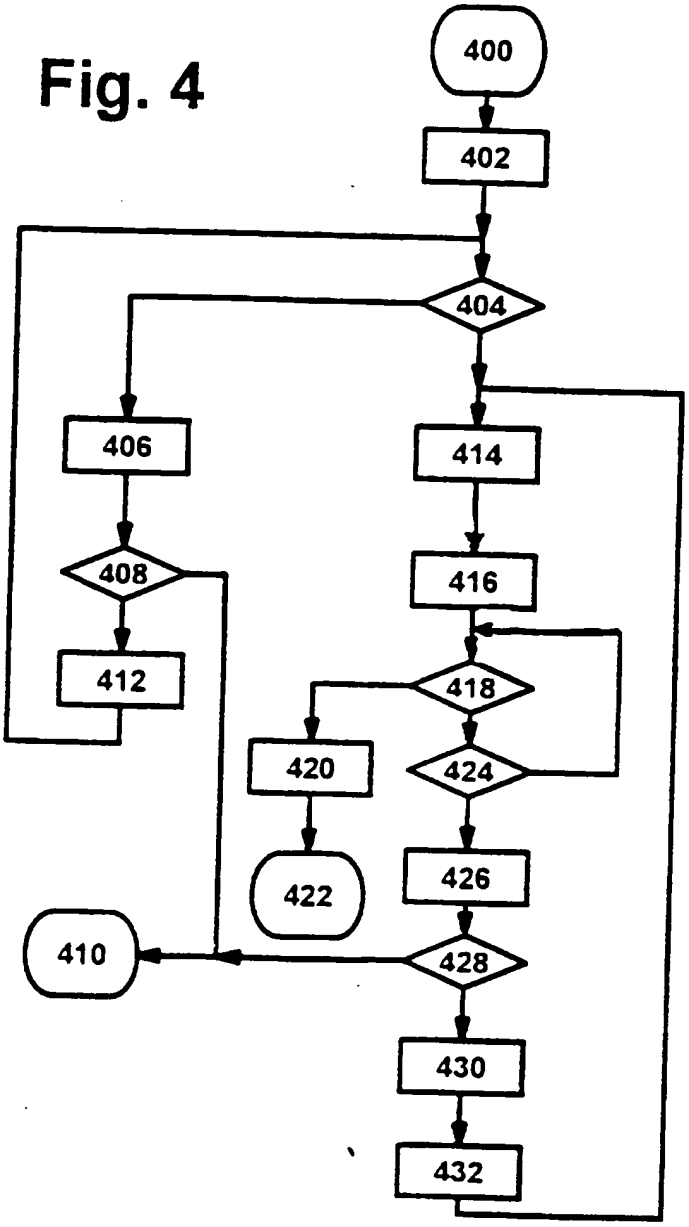



Fig. 5

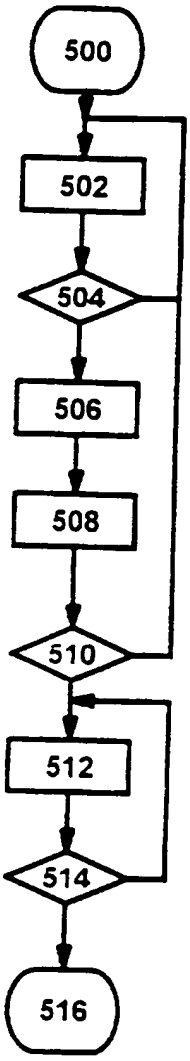
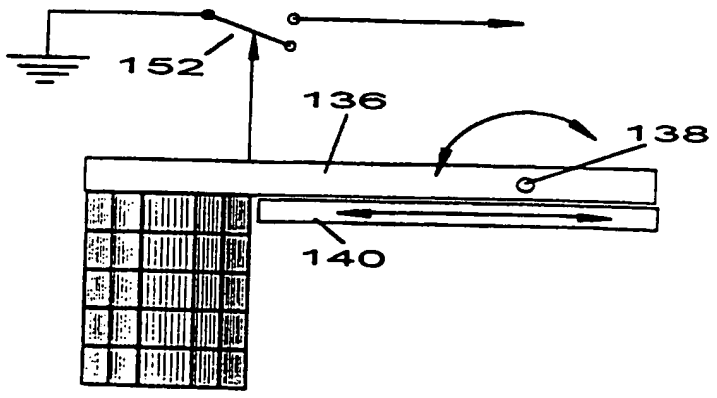



Fig. 6



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# COIN STORE

This invention relates to a coin store. The invention is particularly, but not exclusively, related to coin stores of the type in which the last coin to enter the store is the first to be dispensed therefrom.

An example of this kind of store is disclosed in WO-A-94/28520. The arrangement disclosed therein comprises a substantially vertical stack which receives coins in succession, each coin being added to the top of the stack and lying flat thereon. Coins can also be dispensed from the top of the stack. A motor is provided for moving the stack bodily upwardly and downwardly.

The present invention is intended to provide features which improve reliability in the operation of coin stores.

In arrangements in which the stack of coins is moved in order to position the uppermost coin at a dispensing location, it is necessary to provide means for ensuring that the coin is correctly located before dispensing occurs. The accuracy with which the coin needs to be positioned at the dispensing location is determined by a number of factors, including coin thickness. If the coin is not accurately positioned, various problems can occur, such as jamming, or dispensing of more than one coin.

According to a first aspect of the present invention, a coin store, which is operable to dispense coins from a stack by moving the stack to bring the uppermost coin to a dispensing position and then using a dispensing member

to remove the uppermost coin from the stack, is arranged such that the dispensing member moves with the stack as the uppermost coin is brought to the dispensing position, so that the dispensing member has a predetermined positional relationship with the uppermost coin.

This ensures that the dispensing member, which may be in the form of a slide, correctly engages the uppermost coin, thus allowing more tolerance in the positioning of the uppermost coin.

In the preferred embodiment, the dispensing member is moved by the stack. Preferably, the uppermost coin of the stack engages an element as the stack is lifted. This element is either part of the dispensing member or is physically coupled (either directly or indirectly) to the dispensing member for movement therewith. A sensor detects when the element has moved to a predetermined position, the output of the sensor being used to control the operation of the actuator which moves the stack. The sensor may be positioned so that the stack actuator halts the movement of the stack when the uppermost coin is in the correct dispensing position. In a preferred embodiment, however, the motor is stopped when the coin is slightly above the dispensing position, and then operates in the reverse direction to move the coin slightly and thus bring it into the dispensing position. This "backing-off" movement is desirable to reduce the friction which might otherwise occur between the uppermost coin and the element as the coin is dispensed. In any event, exact positioning is no longer required, because the dispensing member

moves with the uppermost coin to ensure a correct positional relationship therewith.

When a coin needs to be dispensed, the stack is lifted to bring the uppermost coin to the dispensing position. If several coins are to be dispensed, then the stack remains in the lifted position, and is moved upwardly by approximately the thickness of the coin each time a coin is dispensed so as to bring the next coin to the dispensing position.

According to another aspect of the invention, which is preferably but not necessarily combined with the aspect set out above, the top of the stack is maintained at a rest position substantially below the dispensing position as coins are delivered in succession to the stack. Each time a coin is delivered to the stack, the stack is lowered by an amount corresponding to the thickness of the coin. Additionally, or alternatively, the top of the stack is brought to such a rest position each time a coin is dispensed. In this way, each coin has to fall a considerable distance before landing on the stack, which makes it substantially more likely that the coin will come to rest in the correct position, lying flat on the top of the stack, but still allows a relatively high dispensing location. The rest position is preferably spaced below the dispensing position by a distance which is at least as great as the diameter of the coins to be stored (or the diameter of the largest coin to be stored, if the store is to contain different denominations). There is thus sufficient room for re-orientation of the coin after it enters the store, either before it contacts the stack or after it

impacts and possibly bounces off the stack. Such an arrangement means that there is no need to re-orient the coin prior to entering the store; in other words, as in the preferred embodiment the coin can be delivered to the store edge-first, which means that the delivery channel can be more compact.

Another aspect of the invention is applicable to the arrangement described above, but also to other types of coin store. As indicated above, it is desirable to arrange a coin store such that each successive coin reliably lies flat on the top of the stack. However, this does not always occur, which can result in problems such as jamming.

According to a further aspect of the invention, a coin store is arranged to receive coins in succession, each coin being added to the top of a stack in which the coins are stored, the store having means to detect that a received coin is not lying flat on the stack and, in response thereto, to cause reciprocal (and preferably upward and downward) movement of the stack so as to tend to cause the coin to lie flat.

This aspect of the invention is particularly useful in coin stores of the type mentioned above, in which the last coin to be delivered to the stack is the first to be dispensed, and in which for this purpose an actuator is provided for lifting the stack. In the preferred embodiment, this actuator is also used for causing the upward and downward movement of the stack so as to bring a coin into a flat orientation. Preferably, the stack is reciprocated so that it

moves upwardly and downwardly more than once, preferably moving the stack in a vigorous manner so as to bring the coin into the correct orientation.

A sensor may be provided to detect that the received coin is not lying flat, and this may take the form of an optical sensor located relative to the stack such that it is above the last-received coin and would therefore normally be adjacent the next-received coin after this reaches the stack. Thus, failure to sense the last-received coin can be taken as an indication that the coin is not lying flat, but is instead in some other orientation. This can be used to trigger the upward and downward movement of the stack.

In the preferred embodiment, this same sensor is used for positioning the stack after each coin is received and/or dispensed. Thus, a control system may be arranged to move the stack downwardly until the sensor no longer detects a coin and then leave the stack in this position, ready for receipt of another coin. When the next coin is received, this is detected by the sensor so as again to cause movement of the stack downwardly until the coin is no longer detected. On the other hand, if a coin is sent to the stack but not sensed by the sensor, the upward and downward movement of the stack is executed so as cause the coin to lie flat, following which the stack is moved downwardly until the coin is no longer detected and the stack again is in its correct position and ready to receive another coin.

A further aspect of the invention relates to a coin store of the type in which the stack is moved as a whole in order to dispense a coin from an end

thereof, and particularly to a coin handling device including such a store. In accordance with this aspect of the invention, the number of coins in the stack can be determined from an initialisation operation, in which the stack is moved between a first position, in which the endmost coin is at a predetermined location (preferably as detected by a sensor), and a second position in which the other end of the stack is at a predetermined location. The number of coins is then calculated by dividing the amount of movement (which could be deduced from the time taken for the movement) by the known thickness of the coins. In a preferred embodiment, the platform supporting the stack is moved downwardly to its lowermost position, and then a measurement is made of the time taken to move from this position to the position in which the uppermost coin is detected by a sensor. Clearly, the timing could be measured during movement in the reverse direction.

An arrangement embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows schematically a coin operated machine incorporating a coin store in accordance with the invention;

Figure 2 is a perspective view of an embodiment of the invention;

Figure 3 is an exploded view of a dispensing unit of the embodiment of Figure 2;

Figure 4 is a flow chart of the operation of the store when a new coin is received;

Figure 5 is a flow chart of a dispensing operation of the store; and

Figure 6 is a schematic view of a dispensing unit to illustrate the manner of operation.

Referring to Figure 1, a coin-operated machine 1 comprises a coin entry slot 10, a coin acceptor mechanism 20, a coin store 30, and a coin outlet 40. A first coin entry channel 50 interconnects the coin entry slot 10 and coin acceptor 20; a second coin entry channel 60 interconnects the coin acceptor 20 and the coin store 30, and a coin exit channel 70 interconnects the coin store 30 and the coin outlet 40.

The coin entry slot 10, coin acceptor 20, coin outlet 40 and coin channels 50. 60. 70 are in themselves of generally conventional design. For example, the acceptor may be as described in our earlier application GB-A-2094008 or GB-A-2093620.

Also present, indicated generally by 2, is conventional coin-operated machinery (for example, for playing a game) which is actuated in response to acceptance of a coin by the coin acceptor 20.

Although only a single coin store 30 is shown in Figure 1, in embodiments which are intended to receive multiple coin denominations, a plurality of such coin stores 30 are provided, connected via respective coin entry channels 60 to respective outlets of the coin acceptor 20 and via respective outlet channels 70 to the coin outlet 40.

In operation, a coin is inserted into the coin entry slot 10 and rolls down the coin channel 50 to the acceptor 20. If the coin is acceptable, the acceptor 20 passes it to the appropriate one of the entry channels 60 (depending on coin denomination), through which it rolls into the coin store 30. The coin is received onto the top of a stack of coins in the store, the top of which is kept at a constant level, as detailed below. If the coin is rejected, the acceptor 20 passes it through a reject coin channel (omitted from Figure 1 for clarity) to the coin outlet 40. When it is necessary to pay out coins, for example where a user has won a game or where change is required, a control unit of the coin operated machinery 2 supplies a command signal to the coin store 30 to supply the uppermost coin to the coin exit channel 70, down which it rolls to the coin outlet 40 which comprises a payout tray from which it may be retrieved by the user.

Referring to Figures 2 and 3, the coin store 30 will now be described in greater detail.

The coin store 30 comprises a control unit (not shown) and a mechanical storage unit 100. The unit 100 comprises, generally, a storage section 102, a transport section 104 and a dispensing section 106. The storage section 102 comprises a tubular housing 108, which in this embodiment is of a translucent plastics material to allow inspection of the length of the coin stack. The housing 108 is shown partially cut away to allow other features to be seen.

A platform 110 is mounted for upward and downward movement within the housing 108, and is intended to support a stack of coins thereon.

A sensor unit 112 is mounted near the top of the housing 108. This sensor unit 112 carries a pair of optical sensors 114 arranged to receive light from optical emitters (not shown) positioned on the opposite side of the tubular housing 108. The sensor unit 112 can thus sense the coins forming the stack. Other types of sensing means are possible, e.g. a single emitter/sensor pair, possibly with a mirror to provide plural light paths.

The platform 110 is supported by a carriage 116 which extends through a slot (not shown) in the side of the housing 108 and is mounted for upward and downward movement along the transport section 104. A drive belt 118, shown only by a broken line, is clamped to the carriage and extends around an upper pulley 119 mounted in a pulley block 120, and downwardly to a drive pulley 122 driven by a motor 124 and then onto a lower pulley 126 mounted in a pulley block 128, and then back upwardly to the carriage 116. Operation of the motor 124 thus causes the platform 110 to move upwardly or downwardly within the tubular housing 108. The carriage 116 is provided with rollers such as those shown at 130 to facilitate movement.

The motor may be a DC motor, which may be provided with suitable gearing, or could be a stepper motor.

The dispenser unit 106 comprises a body 132 mounted to the top of the transport section 104. A coin entry 134 is fixed to the top of the dispenser

body, and overlies the tubular housing 108. A slide carrier 136 is mounted so that it extends between the coin entry 134 and the lower part of the dispenser body 132. The slide carrier 136 is pivotably mounted about a horizontal shaft 138.

A coin slide 140 is positioned beneath the slide carrier, and is held thereto by a pair of flanges one of which is shown at 142. The slide 140 can move laterally (to the left and right as shown in the figures) with respect to the slide carrier.

The dispenser unit has a dispenser motor (not shown) the shaft of which has fitted thereon a crank 144, which is positioned within the dispenser body. This crank has an upwardly projecting pin 146 which locates in a slot 148 of the coin slide 140, the slot 148 extending in a direction transverse to the desired movement direction of the coin slide. Thus, a single rotation of the shaft of the dispensing motor will cause the coin slide to be shifted first to the left as shown in the drawings, to execute a dispensing movement, and then back to the right, by virtue of the engagement of the pin 146 and the slot 148. The extreme right position of the coin slide 140 is detected by a microswitch 150.

Assuming that a stack of coins is supported by the platform 110, and that this is moved upwardly by the drive motor 124, then the uppermost coin of the stack will eventually engage the underside of the slide carrier 136 and pivot the slide carrier upwardly. This also lifts the attached coin slide 140

upwardly. A microswitch 152 attached to the coin entry 134 detects when the slide carrier is moved upwardly.

Coins are delivered edge-first in succession to the tubular housing 108 via aligned slots 154 and 156 in the coin entry 134 and slide carrier 136, respectively.

The operation of the coin store will be described below.

An initialisation operation is performed when the power is turned on, or upon command by a service engineer. The initialisation operation causes the motor 124 to lower the platform 110 to its lowermost position, as detected by operation of a switch or other sensor means (not shown). The motor then drives the platform 110 upwardly until at least one of the sensors 114 is covered. At some stage during this initialisation operation, the motor is preferably caused to be operated to drive the stack upwardly and downwardly, preferably a plurality of times (e.g. five or six) in each direction. The motor could be arranged to operate for a predetermined duration in each direction. This operation is performed because the uppermost coin may not be in the correct orientation, e.g. it may be supported on its edge, and this reciprocating operation will tend to cause the coin to lie flat.

At the end of the initialisation operation the stack is driven downwardly until the sensors 114 are uncovered. Thus, the uppermost coin of the stack supported by the platform 110 (or the platform 110 if there are no

coins currently present in the store) will be located immediately below the sensors 114.

This initialisation operation enables the control circuit to determine the number of coins currently stored in the stack, given the known thickness of the coins and the stack height, which can be obtained by measuring the time taken for the motor to drive the stack from the lowermost position to the position in which a sensor 114 is covered (or in other ways, e.g. by counting the number of stepping pulses applied to the motor if a stepper motor is used). This is useful in order to provide audit information which is stored by the machine and which can be periodically downloaded. It is also useful in subsequently controlling the dispensing of coins as change, in that if the count is adjusted in accordance with the number of coins sent to and dispensed from the store, the running total can indicate when the number of coins in the stack has diminished to the extent that the user needs to be warned that exact change is required.

During normal operation of the coin store, assuming that a coin of an appropriate denomination has been accepted by the acceptor 20, then the coin is delivered to the tubular housing 108 via the slots 154 and 156. The program illustrated in Figure 4 is then executed by the control unit of the store 30.

The program starts at step 400. This step involves initialising certain timers, loop counters etc. There then follows a delay (step 402) to allow

sufficient time for the coin to pass from the coin acceptor 20 to the top of the stack in the tubular housing 108. It is to be noted that the coin will be falling through the slots 154 and 156 onto the top of the stack, located immediately below the sensor unit 112, so there should be sufficient energy in the coin as it impacts the stack to ensure that it lies flat, generally after bouncing, rather than standing on edge.

This means that after the delay period, the sensors 114 should be covered by the coin just received. This is checked at step 404.

If at least one of the sensors 114 is detected to be uncovered at step 404, this suggests that in spite of the dropping of the coin onto the stack, it has still not rested in a flat orientation, but is instead lying inclined on one edge (as indicated by the broken line 160 in Figure 2). In this situation, a jam may be caused. Accordingly, the program proceeds to step 406. Here, the program increments a loop counter representing the number of times the step 404 has determined that a sensor 114 is uncovered. This loop counter is checked at step 408, and if it exceeds a predetermined number an error signal is generated at step 410. This error signal can be used to produce an alarm, to set a flag so that the coin store 30 is no longer used, or for a variety of other reasons.

Assuming that the loop counter has not yet reached the predetermined number, the program proceeds to step 412. Here, the motor 124 is caused to be operated to drive the stack upwardly and downwardly, preferably a

plurality of times (e.g. 5 or 6) in each direction. The motor could be arranged to operate for a predetermined duration in each direction. This should tend to cause the uppermost coin to lie flat.

At the end of the reciprocating movement of the stack caused during step 412, the sensors 114 are checked again at step 408. If at least one of them is still uncovered. the program proceeds again to step 406.

In the vast majority of cases, however, the sensors will have been determined to be covered the first time step 404 is reached or, if not. the next time. The program will then proceed to step 414, where the operation of a timer is initiated.

Then, at step 416, the motor 124 is operated to start lowering the stack on the platform 110.

At step 418 the sensors 114 are all checked, and if they are uncovered the program proceeds to step 420 at which point the stack movement is stopped, and the program then ends at step 422. The uppermost coin in the stack will again be located just beneath the sensors 114.

If the sensors are not detected to be covered at step 418, the program proceeds to step 424 to check the timer. If the timer indicates that a predetermined duration has not yet expired, the program loops back to check the sensors again at step 418. This continues until the sensors become uncovered or the timer duration has expired. In the latter case, i.e. when the sensors remain covered despite the fact that the stack has been lowered by a

substantial amount, this indicates that the last-received coin may be in an upright orientation such that the sensors 114 are covered. In this situation the program proceeds to step 426, to increment a loop counter representing the number of times the timer duration has expired. At step 428, this counter is compared with a predetermined value, and if the predetermined value is exceeded the program proceeds to step 410 to issue an error signal.

Otherwise, the program will proceed to step 430, where the motor 124 is driven to lift the stack for a period equal to the predetermined duration during which it has been driven downwardly. Then, at step 432, the motor is operated upwardly and downwardly (or vice versa) for a predetermined number of times, so as to bring the uppermost coin into a flat position. The program then proceeds to steps 414 and 416 to restart the timer and recommence lowering the stack.

In summary, therefore, the program 400 operates so as to cause reciprocating movement of the stack (at steps 412 and 432) if the receipt of a coin does not cause the sensors to be covered, or if the lowering of the stack does not cause the sensors to become uncovered. If such reciprocating movement does not achieve the desired object, it is repeated a predetermined number of times before an error signal is generated.

In an alternative embodiment, the reciprocating movement at step 412 is performed each time a coin is sent to the stack, rather than performing the operation conditionally upon the state of the sensors. If desired, the sensors

could be checked after the reciprocating operation, to determine whether the reciprocating operation should be repeated.

Assuming that a coin is to be dispensed, the program illustrated in Figure 5 is executed. The program starts at step 500, and then proceeds to step 502 wherein the motor 124 is operated so as to drive the stack upwardly. The stack will therefore be lifted until the uppermost coin engages the slide carrier 136. As illustrated schematically in Figure 6, this will then cause the carrier 136 to pivot about shaft 138, and thus operate microswitch 152.

The program checks the microswitch 152 at step 504, and if it has not been operated the program loops back to step 502. The stack therefore will be raised continuously until the slide carrier 136 has been pivoted to a position in which the microswitch 152 is operated. This is detected at step 504 and the program then proceeds to step 506.

At this point, the drive motor 124 may be operated for a brief duration in order to lower the stack, this reduces the frictional forces between the uppermost coin and the slide carrier 136 during the dispensing action. Although in this embodiment the duration of the downward movement of the stack is controlled by a timer, it could instead be controlled by a sensor, or indeed by the microswitch 152 moving back to its initial state.

Following this "backing-off" movement, at step 508, the dispensing motor is operated in order to move the slide 140, which pushes the uppermost coin off the top of the stack into the coin channel 70 for dispensing. Because

the slide 140 is carried by the carrier 136, it has, as indicated in Figure 6, a known positional relationship with the top of the stack and therefore it will always reliably engage the uppermost coin.

After the slide starts to move, the state of the microswitch 150 will change. As the dispensing motor continues to operate, the slide will be brought back by the crank 144 to its original position in which the microswitch 150 is caused to adopt its initial state, which serves to turn off the dispensing motor.

After the slide operation at step 508, the program proceeds to 510 to check whether any more coins are to be dispensed during this operation. If so, the program loops back to step 502, at which the stack is again raised in order to bring the next coin to the dispensing location.

After all the required coins have been dispensed, the program proceeds to step 512 where the stack is lowered. The sensors 114 are checked at step 514 and the lowering 512 continues until these are uncovered, following which the program stops at step 516.

In the arrangement described above, the slide carrier 136 is pivoted by the upward movement of the stack but other types of movement, such as a linear movement, are possible. It is not essential that the slide carrier 136 and the slide 140 be separate elements; they could instead be a single member.

Although it is assumed in the description set out above that the store 30 has a discrete control unit, the functions performed by this control unit

could instead be performed by the control unit of the coin acceptor 20 or of the coin-operated machinery 2.

Although the tubular housing 108 is substantially vertical in the embodiment described above, it could in fact be inclined at an angle, with a corresponding change in the direction of movement of the platform 110. Also, the coin receiving surface of the platform 110 need not be normal to the axis of the tubular housing 108, but could be inclined so as to form a stack of coins having their surfaces inclined to that axis.

In this document, the term "coin" is intended to include coin-like tokens, whether or not they are official or convertible currency. Also, the terms "light", "optical" and so on are intended to include forms of radiation which substantially obey the laws of optics, whether or not they lie within the visible spectrum.

CLAIMS:

1. A coin store which is operable to dispense coins from a stack by moving the stack to bring the uppermost coin to a dispensing position and then using a dispensing member to remove the uppermost coin from the stack, wherein the dispensing member is arranged to move with the stack as the uppermost coin is brought to the dispensing position so that the dispensing member has a predetermined positional relationship with the uppermost coin.

2. A coin store which is arranged to receive coins in succession and add each to the top of a stack in which the coins are stored, means being provided to detect that a coin has been received and, in response thereto, to cause reciprocal movement of the stack so as to tend to cause the coin to lie flat.

3. A coin store as claimed in claim 2, wherein means are provided to detect that a received coin is not lying flat on the stack and wherein the reciprocal movement of the stack is caused in dependence on detecting such a condition.

4. A coin store as claimed in claim 2 or 3, including means for dispensing a coin from the top of the stack.

5. A coin store as claimed in claim 4, including means for lifting the stack to bring the uppermost coin to a dispensing position before dispensing the coin.

6. A coin store as claimed in claim 5, including means for lowering the stack after a dispensing operation so that the uppermost coin lies at a predetermined distance below the dispensing position so that, when a further coin is to be added to the stack, the further coin has to drop at least the predetermined distance, thereby to make it more likely that the further coin will lie flat on the top of the stack after impacting the stack.

7. A coin store which is operable to dispense coins from a stack in which the coins are stored in a substantially horizontal orientation by moving the stack to bring the uppermost coin to a dispensing position and then removing the uppermost coin from the stack, means being provided to lower the stack after a dispensing operation so that the uppermost coin lies at a predetermined distance below the dispensing position so that, when a further coin is to be added to the stack, the further coin has to drop at least the predetermined distance, thereby to make it more likely that the further coin will lie flat on the top of the stack after impacting the stack.

8. A coin store as claimed in claim 6 or 7, including a dispensing actuator for removing a coin located at the dispensing position from the stack.

9. A coin store as claimed in claim 6, 7 or 8, including means for maintaining the uppermost coin at said predetermined distance below the dispensing position as further coins are added to the top of the stack.

10. A coin store as claimed in any of claims 6 to 9, wherein the predetermined distance is at least the diameter of any coin to be stored in said store.

11. A coin store as claimed in claim 2 or any claim directly or indirectly dependent thereon, wherein the reciprocal movement comprises movement upwardly and downwardly.

12. A coin store as claimed in claim 2 or any claim directly or indirectly dependent thereon, wherein the reciprocal movement comprises movement a plurality of times in each of two opposite directions.

13. A coin store as claimed in claim 2 or any claim directly or indirectly dependent thereon, including an actuator operable to move the coin stack in order to bring the uppermost coin to a position for dispensing the coin, wherein the actuator is operable to cause said reciprocal movement in response to detecting that the received coin is not lying flat.

14. A coin store as claimed in claim 13, including sensing means, the actuator being operable to move the stack to bring the uppermost coin to a rest location determined by said sensing means, said sensing means being further operable to determine that the received coin is not lying flat.

15. A coin store as claimed in claim 5, claim 7 or any claim directly or indirectly dependent on claim 5 or claim 7, including a dispensing member for removing the uppermost coin from the stack, wherein the dispensing member is arranged to move with the stack as the uppermost coin

is brought to the dispensing position so that the dispensing member has a predetermined positional relationship with the uppermost coin.

16. A coin store as claimed in claim 1 or 15, wherein the uppermost coin of the stack is arranged to engage an element and to move that element as the stack is moved upwardly, means being provided to sense the element being moved to a predetermined position in order to halt the upward movement of the stack.

17. A coin store as claimed in claim 16, wherein the element is part of the dispensing member.

18. A coin store as claimed in claim 16, wherein the element is a member to which the dispensing member is mechanically coupled.

19. A coin store as claimed in any one of claims 16 to 18, including means for lowering the stack after the sensor has detected that the predetermined position of the element has been reached, and prior to the dispensing of a coin.

20. A coin handling device comprising a coin store which is operable to dispense coins from a stack by moving the stack to bring an endmost coin to a dispensing position, the device further comprising means for carrying out an initialisation operation in which the stack is moved between a first position in which said endmost coin is at a predetermined location and a second position in which the other end of the stack is at a

predetermined location, means being provided to calculate the number of coins in the stack on the basis of the amount of movement.

21. A device as claimed in claim 20, wherein the amount of movement is determined from the time taken to move between said first and second positions.

22. A coin store substantially as herein described with reference to the accompanying drawings.

The Patent Office

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**Application No:** GB 9715676.4
**Claims searched:** 1, 16-19

**Examiner:** Paul Makin
**Date of search:** 15 October 1997

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4V (VAG) ; G4X (X5)

Int Cl (Ed.6): G07D 1/00 ; G07F 5/24

Other: Online : WPI

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | Relevant to claims |
|---|---|---|
| A | US 4687089 (WUETHRICH) | 1 |

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| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
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